Evaluation Assignment Six: Usability Test Report

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Introduction

Design Description

The Eelgrass Monitoring App was developed in coordination with Massachusetts state marine fisheries specialist. The intent was to create a web-based mobile application that will replace the paper datasheets used by marine biologists and citizen scientists in the collection of eelgrass data during monitoring events. The app covers the following scenarios:

1. Users can sample and record the data in a progressive manner as per the instructions prompted on the screen. This can be repeated for multiple samples.
2. Scientists and Marine specialists can download the data in the form of CSV to analyze it.

The intent was to create an intuitive and user-friendly app that the users can easily navigate and record their observations while reducing the number of errors. The users are also provided with a help text to guide throughout the navigation of the application.

Test Goals and Description

Each user testing session consisted of three scenarios that had specific goals. The first scenario was focused on evaluating the size of elements and functionality. Since the primary purpose of the app was to record data on a moving boat it is important to ensure that text and the UI elements in the app are easy to read and use. The users were asked to navigate through the natural flow of the app and complete all the fields with relevant random details. They were asked to note down any irregularities in the elements and text and report them.

The second scenario focused on text input validation, feedback, and errors. The app consists of multiple fields which require values of a specific format to ensure its validity. It was important to make sure that the app does not allow invalid data and prompts the user to enter the correct data. To test this the users were asked to navigate through the natural flow of the app and complete all the fields with relevant random details. They were asked to note down any fields where they are able to enter arbitrary or invalid data and the app does not give proper feedback.

The third scenario focused on the login page and download trip data. The administration interface of eelgrass monitoring app consists of a login and a download page. It is important to ensure that a user can login and download the data seamlessly. To test this the users were asked to login and download an instance of the trip record. They were asked to note down any issues they have faced while downloading the data and were then asked to verify the accuracy and note down any inconsistencies found within the data.

Test Plans

Six usability test sessions were conducted in between April 14, 2019 and April 20, 2019 in the Van Pelt and Opie Library at Michigan Technological University, Houghton MI. Each session lasted for about 50 minutes and consisted of two scenarios. The participants were recruited by the instructor, Dr. Pastel through the usability testing sign-up sheets which were distributed to students attending Michigan Tech for extra credit.

Outline of The Usability Test Plan

1. Introductory Events
2. Signing of the consent form
3. Pre-Test questionnaire
4. Usability Testing
5. Post-Test Questionnaire

Introductory Events

The tester welcomed the participant and had the participant sit at a desk or a table and complete the initial paperwork. The tester then described the objective of the app and why it was developed. Then, the tester ascertained the participant that **"This test imposes minimal risk, no harm should come to you performing the test, the results of the usability test are anonymized, and if at any time you wish to terminate the testing you may. We will be using a video recorder and keylogger apps for testing purposes. Please let me know if you have any concerns".** The tester also mentioned that **"The data being collected will be kept confidential and any link to trace the identity of the participant will be destroyed".**

Signing of the Consent Form

The participants were handed out the following consent form and asked to read and sign it before returning it to the tester.

Computer User Interface Usability Testing Consent Form

You are being invited to participate in a research study to determine the usefulness and usability of computer user interfaces. This study is being conducted by Dr. Robert Pastel of Michigan Technological University Computer Science Department and students in Dr. Pastel's Human-Computer Interaction (MCI) courses. The students are performing the usability tests as part of their project and to fulfill the HCI course requirements.

There are no known risks if you decide to participate in this research study. There are no costs to you for participating in the study. The information you provide and tasks that you will perform will determine the usefulness and usability of user interfaces. The questionnaires and the tasks should take less than an hour to complete. The information collected may not benefit you directly, but the information learned in this study should provide more general benefits.

The questionnaires and test are anonymous. Do not write your name on the survey. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study except for the instructor of the class that is giving you credit for participating, Should the data be published, no individual information will be disclosed.

Your participation in this study is voluntary. By completing the questionnaires and performing the tasks, you are voluntarily agreeing to participate. You are free to decline to answer any particular question you do not wish to answer or not to perform a task for any reason.

If you have any questions about the study, please contact Dr. Robert Pastel, Assistant Professor, Computer Science Department, Michigan Technological University, Houghton, MI 49931.

The MTU Institutional Review Board has reviewed my request to conduct this project. If you have any concerns about your rights in this study, please contact Joanne Polzien of the MTUIRB at 906-487-2902 or email jpolzien@mtu.edu.

Participant signature and date:

Pre-Test Questionnaire

Before the usability testing, the participants were asked to fill out the following Demographic/Pre-Test questionnaire.

PRE TEST QUESTIONAIRE

Test Date/Time: Age: Gender:

Please answer the following questions by checking against the choice you feel is appropriate

Q1. I have been using a smartphone for (only check one):

1. less than a year
2. 1~2 years o 2~3 years
3. more than 3 years
4. Not applicable (check only if you do not use a smartphone)

Q2. I have been using a computer for (only check one):

1. less than a year
2. 1~2 years o 2~3 years
3. more than 3 years
4. Not applicable (check only if you do not use a computer)

Q3. I normally use a smartphone with the following operating system:

1. iOS
2. Android
3. Do not use a smartphone

Q4. The physical size of my smartphone screen is (only check one):

1. 3.7 ~ 4.7 inches
2. 5.0 ~ 5.2 inches
3. > 5.2 inches
4. Not applicable (check only if you do not use a smartphone)

Q5. Did you participate in usability testing before?

1. Yes
2. No

Usability Testing

One of the two following scenarios were evaluated during usability testing. After the tasks pertaining to the scenario were completed the participants were asked to fill out a questionnaire specific to that scenario.

Test Scenario 1: Evaluating the size of elements and functionality

Goals:

- To check if the elements are of appropriate size for easy data entry on a moving boat
- To check if the fonts are visible and the text is easy to understand
- Determine if the form elements are appropriate for capturing a particular record

Quantitative Measurement:

- Number of cases where an element seemed too big or small
- Number of cases where the text was ambiguous and not visible
- Number of cases where an element was ambiguous and the user the required help to capture the record
- Number of bugs recorded in this process

Scenario Description:

The participants were asked to imagine as if they are on a moving boat. They were requested to launch the app and start capturing a new trip. They were then asked to navigate through the natural flow of the app and complete all the fields with relevant random details. They were finally asked to note down any irregularity in text and elements displayed on the page and record the number of times they required help to capture a particular record.

The participants were provided with Sample Data for reference

Task List:

1. Open the Eelgrass Monitoring App
2. Select Add a New Trip
3. Start filling the form and navigate through the pages with relevant random details
4. Observe the inconsistencies with sizes of elements and functionality
5. Record them
6. Click on Submit

Qualitative Measurement:

- Facial expressions and comments of the participants while recording the form
- Difficulties in reading the text or understanding the functionality of a particular element
- Ease of use

Potential Observations of Participant:

- Is the distance between the smartphone and the participant's eyes inconsistent?
- If the participant is asking questions?
- If the participant is feeling confused at any moment?
- Overall feedback from the participant

Post Scenario Interview and questionnaire questions:

The following questionnaire was handed out after the testing.

POST SCENARIO QUESTIONNAIRE (Scenario 1)

Please indicate your level of satisfaction with the app you have just worked on. Check the option that reflects your satisfaction level:

Q1. I thought the size of texts were accurate

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Q2. I though the size of the elements were accurate

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Q3. I found the elements relevant to the record

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Q4. I could complete the form without help

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

In the space below provide any comment you like to share about this test scenario:

Test Setup Details:

The users were performing this test in a large room using a smartphone. They were being provided with necessary instructions and guidance as required.

Test Scenario 2: Text input validation, feedback, and errors

Goals:

- To check if the app validates user input for range specific/alphanumeric values
- To check what kind of feedback the app provides
- To check if the app has a fail-safe mechanism in case of an unusual event

Quantitative Measurement:

- Number of text fields where user can input arbitrary data
- Number of events a user is not provided with any feedback while trying to input invalid data
- Number of bugs encountered around the process

Scenario Description:

The participants were asked to imagine as if they are on a moving boat. They were requested to launch the app and start capturing a new trip. They were then asked to navigate through the natural flow of the app and complete all the fields with relevant random details. After this, they were asked to note down any fields where they are able to enter arbitrary or invalid data and the app does not give proper feedback. Further, they were asked to turn on/off airplane mode to disable/enable network connection and record their observations.

The participants were provided with Sample Data for reference

Task List:

1. Open the Eelgrass Monitoring App
2. Select Add a New Trip
3. Start filling the form and navigate through the pages
4. Try entering erroneous data
5. Observe the inconsistencies with validation mechanisms
6. Turn on/off Airplane mode
7. Click on Submit

Qualitative Measurement:

- Facial expressions and comments of the participants while recording the form
- Does the app crash on losing network?

- Does the user find difficulty in entering data in a particular element?

Potential Observations of Participant:

- If the participant is asking questions?
- If the participant is feeling confused at any moment?
- Overall feedback from the participant

Post Scenario Interview and questionnaire questions:

The following questionnaire was handed out after the testing.

POST SCENARIO QUESTIONNAIRE (Scenario 2)

Please indicate your level of satisfaction with the app you have just worked on. Check the option that reflects your satisfaction level:

Q1: I thought I could not enter invalid information

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Q2: I thought the app provided reasonable feedback

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Q3: I thought the app did not crash all of a sudden

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Q4: I thought the app provided useful help information

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

In the space below provide any comment you like to share about this test scenario:

Test Setup Details:

The users were performing this test in a large room using a smartphone. They were provided with necessary instructions and guidance as required.

Test Scenario 3: Login Page and Download Trip Data

Goals:

- To check if the user can login without any glitches
- To verify if the user can download and view submitted trip data
- To verify data consistency

Quantitative Measurement:

- Number of events where a user faced login issues
- Number of events where the user was not able to download and view the required data
- Number of instances where data inconsistencies were found

Scenario Description:

The participants were asked to imagine as if they are scientists analyzing the collected data. They were requested to launch the app and select download trip data. They were then asked to login and download an instance of the trip record. Simultaneously, they were asked to note down any issues they have faced while downloading the data. After downloading the data, they were asked to verify the accuracy and note down any inconsistencies found within the data.

Task List:

1. Open the Eelgrass Monitoring App
2. Select Download Trip Data
3. Login with provided credentials
4. Select a trip record and download it
5. Open the file and view the data
6. Note down any data inconsistencies found / problems faced until here
7. Report

Qualitative Measurement:

- Facial expressions and comments of the participants while logging in and downloading the data
- Does the app behave abnormally when logging in and downloading data?
- Accessibility of the process

Potential Observations of Participant:

- If the participant is asking questions?
- If the participant is feeling confused at any moment?
- Overall feedback from the participant

Post Scenario Interview and questionnaire questions:

The following questionnaire was handed out after the testing.

POST SCENARIO QUESTIONNAIRE (Scenario 3)

Please indicate your level of satisfaction with the app you have just worked on. Check the option that reflects your satisfaction level:

Q1: I did not face any issues while logging in or downloading data

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Q2: I was able to find and download the trip data I was looking for

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Q3: I thought the app did not crash all of a sudden

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Q4: I found the data consistent and as expected

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

In the space below provide any comment you like to share about this test scenario:

Test Setup Details:

The users were performing this test in a large room using a laptop/computer. They were provided with necessary instructions and guidance as required.

Bug Report Form

The following form was used to capture the bugs presented by the participant

Bug Report Form

Number	Bug Name	Uniqueness	Location	Description

Definitions

NUMBER: A bug number is an identifier provided by the usability test administrator when a user encounters a bug.

BUG NAME: The name of an encountered bug which can easily be distinguishable and comprehendible later on.

UNIQUENESS: An asterisk is assigned if the user is encountering the bug for the first time and no other user has encountered it before.

LOCATION: The page where the bug was encountered.

DESCRIPTION: A formal description of the bug that has been encountered.

Post Test Questionnaire

Finally, the participants were asked to fill out the Post Test Questionnaire and a verbal interview was conducted to gauge their feedback

POST TEST QUESTIONAIRE

Please indicate your level of satisfaction with the app you have just worked on. Check the option that reflects your satisfaction level:

Q1. I thought I clearly understood the objective of the app

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Q2. I thought the app was precise with its response and interactions

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Q3. I thought the app did not behave abnormally

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Q4. I thought I was satisfied with the app's interface and design

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Based on your experience please provide some feedback on the following questions:

Did you like the app? 1. YES 2. NO

In your opinion, is there anything that you did not like and would like to be improved?

Is there anything that you liked very much and why?

Please share any comments you have about the study in general:

Sample Data

The participants were provided with the following data for reference during testing

Sample Data (For Reference Only)

Field	Data
Date of Trip	04/21/2019
Harbor	Hancock
Crew Members	Jack, James, Hannah
Boat Name	Titanic
Station Number	1157
Latitude	47.1306
Longitude	-88.5912
GPS Device	Garmin
Wind Direction	W
Wind Speed	0-5 Knots
Sea State	Glass Calm
Tide	Low
Secchi (1) Water Depth	10.5
Secchi (1) Time	09:00:00
Secchi (1) Secchi Depth	9.5
Secchi (1) Did disk touch the bottom?	Check
Secchi (2) Water Depth	15.5
Secchi (2) Time	12:00 AM
Secchi (2) Secchi Depth	8.5
Secchi (2) Did disk touch the bottom?	No
Is this an Indicator Station?	Yes
Drop Frame (1) - Picture Taken?	Yes
Drop Frame (1) - Picture Timestamp	09:10:00
Drop Frame (1) - Sediment	Sand
Drop Frame (1) - Eelgrass Percent Cover	1-10
Indicator Station only: (1-Shoot 1) length	20
Indicator Station only: (1-Shoot 1) width	3
Indicator Station only: (1-Shoot 2) length	30
Indicator Station only: (1-Shoot 2) width	4
Indicator Station only: (1-Shoot 3) length	25
Indicator Station only: (1-Shoot 3) width	2
Indicator Station only: (1) Wasting disease	High
Indicator Station only: (1) Epiphyte cover	Medium
Drop Frame (2) - Picture Taken?	Yes
Drop Frame (2) - Picture Timestamp	09:15:00
Drop Frame (2) - Sediment	Sand
Drop Frame (2) - Eelgrass Percent Cover	0

Indicator Station only: (2-Shoot 1) length	10.5
Indicator Station only: (2-Shoot 1) width	3
Indicator Station only: (2-Shoot 2) length	30.5
Indicator Station only: (2-Shoot 2) width	4
Indicator Station only: (2-Shoot 3) length	20
Indicator Station only: (2-Shoot 3) width	2.5
Indicator Station only: (2) Wasting disease	Low
Indicator Station only: (2) Epiphyte cover	None
Drop Frame (3) - Picture Taken?	Yes
Drop Frame (3) - Picture Timestamp	09:20:00
Drop Frame (3) - Sediment	Cobble
Drop Frame (3) - Eelgrass Percent Cover	0
Indicator Station only: (3-Shoot 1) length	40.5
Indicator Station only: (3-Shoot 1) width	3
Indicator Station only: (3-Shoot 2) length	10
Indicator Station only: (3-Shoot 2) width	4
Indicator Station only: (3-Shoot 3) length	20
Indicator Station only: (3-Shoot 3) width	2
Indicator Station only: (3) Wasting disease	None
Indicator Station only: (3) Epiphyte cover	Low
Drop Frame (4) - Picture Taken?	Yes
Drop Frame (4) - Picture Timestamp	09:25:00
Drop Frame (4) - Sediment	Gravel
Drop Frame (4) - Eelgrass Percent Cover	75-100
Indicator Station only: (4-Shoot 1) length	15
Indicator Station only: (4-Shoot 1) width	3
Indicator Station only: (4-Shoot 2) length	20.5
Indicator Station only: (4-Shoot 2) width	4.5
Indicator Station only: (4-Shoot 3) length	30
Indicator Station only: (4-Shoot 3) width	2
Indicator Station only: (4) Wasting disease	High
Indicator Station only: (4) Epiphyte cover	High

Results

Six testing sessions were conducted for the Eelgrass Monitoring App. Both qualitative and quantitative data were collected throughout user testing. Qualitative data was collected from observing the body language of the participants, watching how the participants completed each scenario and from the post-scenario interview questions. Quantitative data were collected by the pre- and post-test surveys, the post-scenario surveys and data points that could be collected during the scenario.

Demographics

Total number of participants: 6

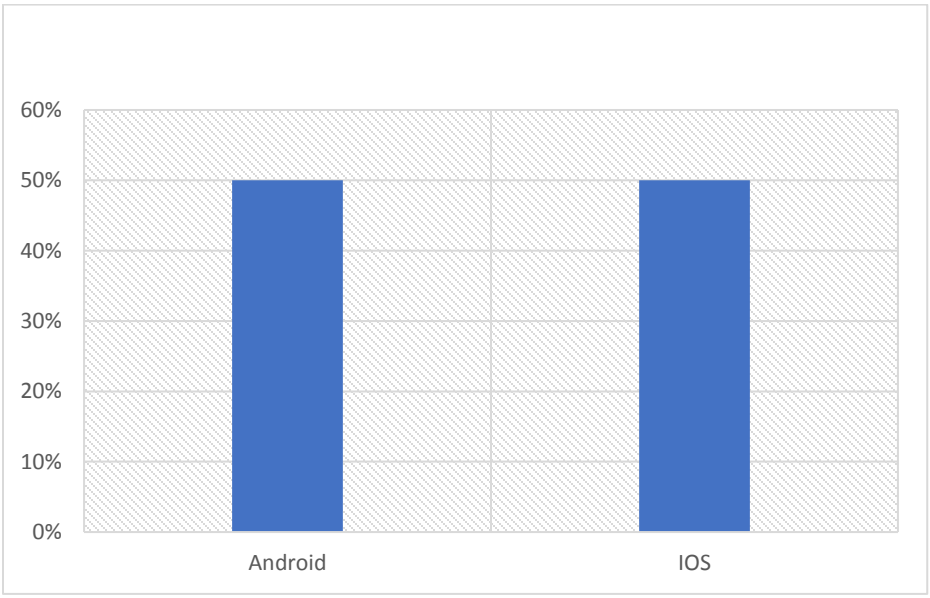
Age of participants: 18-20 Years

Pre- Test Questionnaire

Using Smartphone and Computer: All of them are using both Smartphone and Computer from the past 3 Years

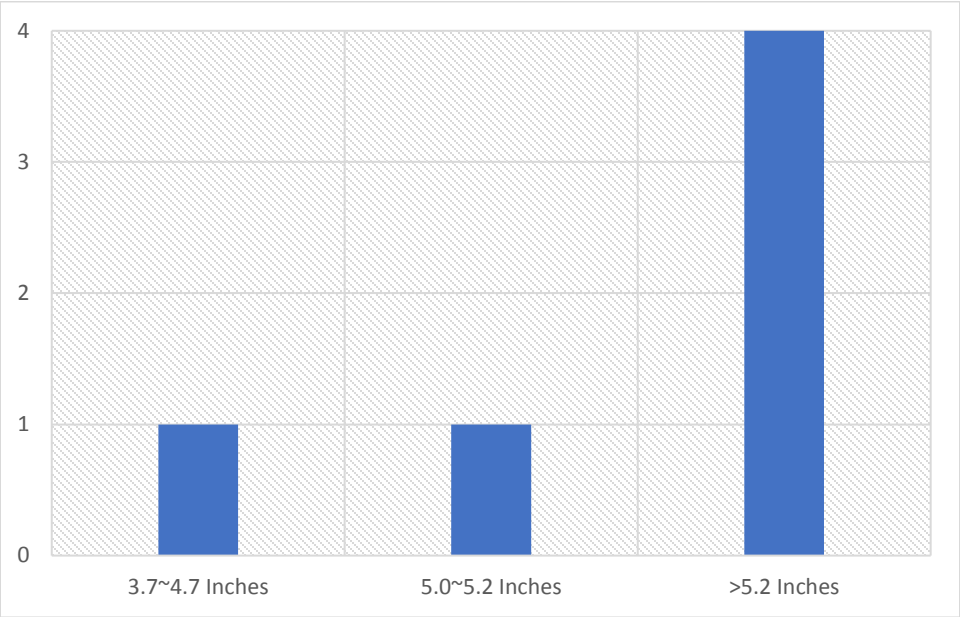
Participation in Usability Testing Before: None of them have participated in a usability test before

Smartphone OS used by participants:



Both Android and IOS have equal popularity among the participants, 3 of them were using Android and 3 were using IOS. This suggests that the app should have compatibility with both these operating systems to work seamlessly.

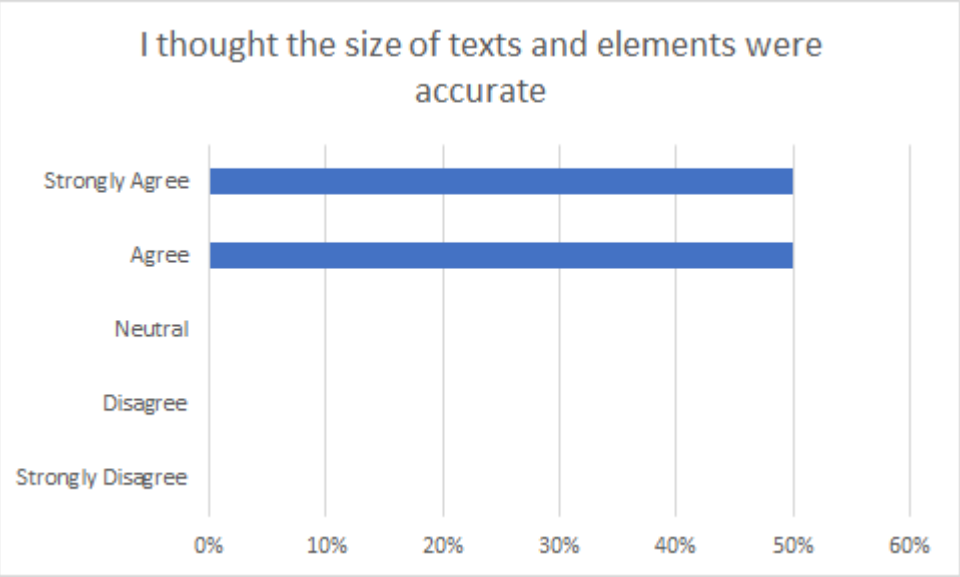
Size of Smartphone screen:



Smartphones with size >5.2 inches were used by 4 participants whereas the other two used phones with sizes in between 3.7~5.2 inches. This is an indication that phones with larger screen size are more popular these days and the app should be designed accordingly.

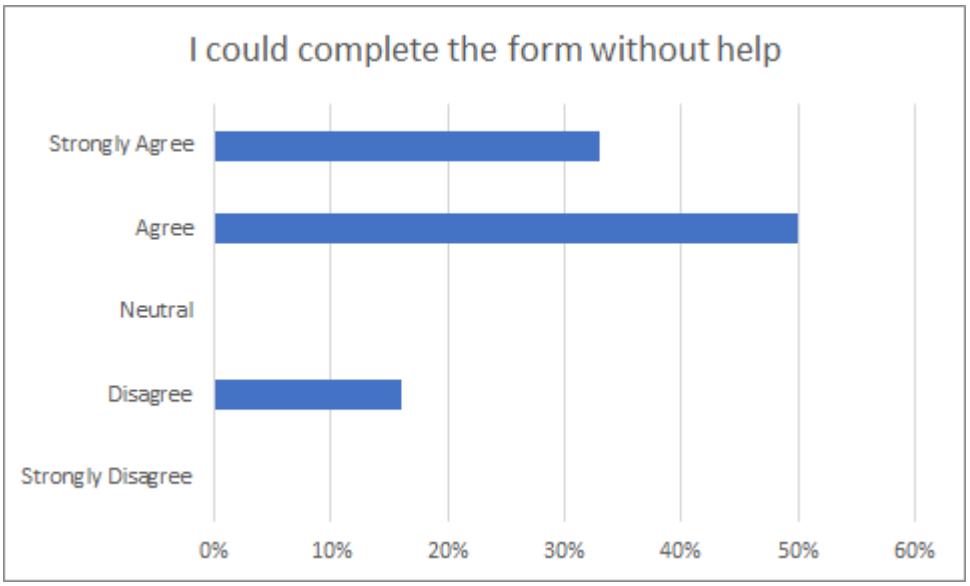
Scenario Based Questionnaire

Q. I thought the size of texts and elements are accurate:



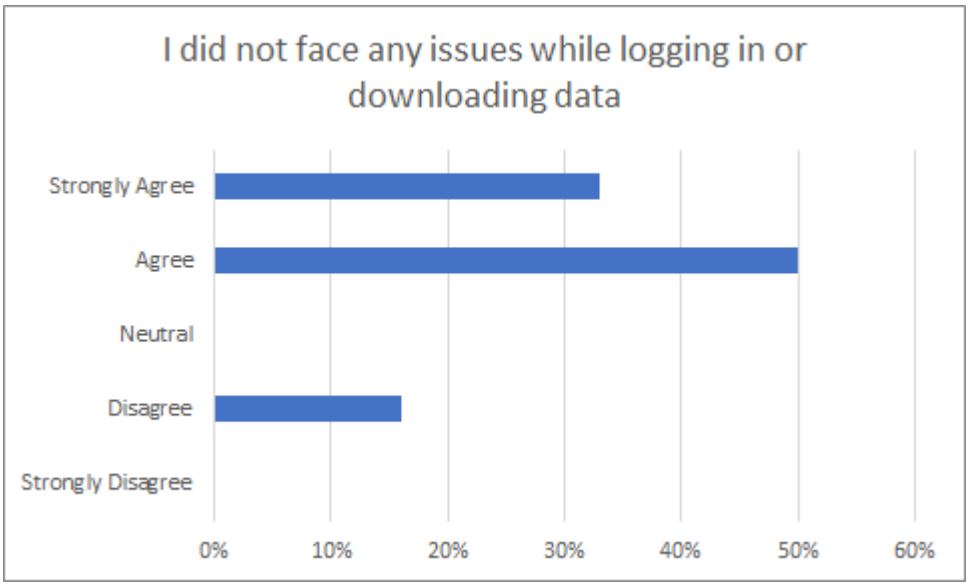
Most of the participants agreed that the size of the texts and elements used in the application were of accurate size for a person to perform data entry on a moving boat.

Q. I could complete the form without help



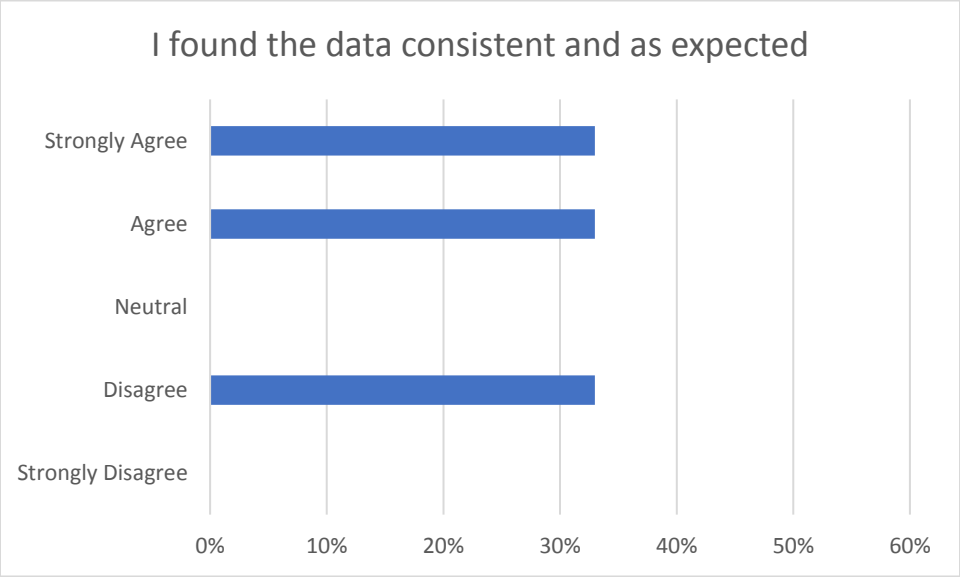
Except for one participant, everyone was able to complete the form without any help. The participant who disagreed to this question was unsure of the units to be entered for water depth. This was fixed by adding a dropdown instead of the textbox to select the units.

Q. I did not face any issues while logging in or downloading data



Except for one participant, everyone was able to login and download the recorded trip data. One user complained of login button being too small as he was unable to locate it.

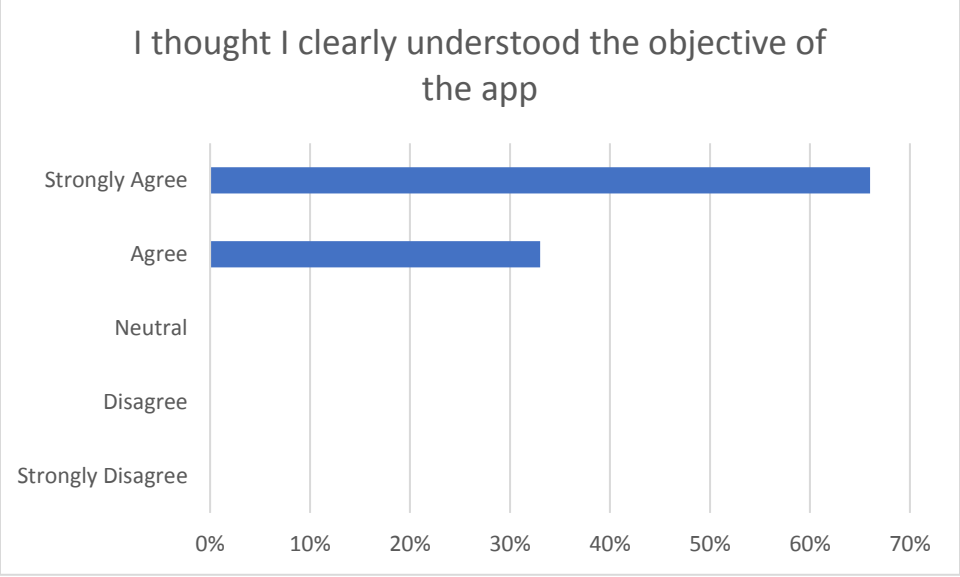
Q. I found the data consistent and as expected



There were mixed responses to this question among the participants due to data consistency issues in the initial tests. The participants were unable to find and download the submitted data.

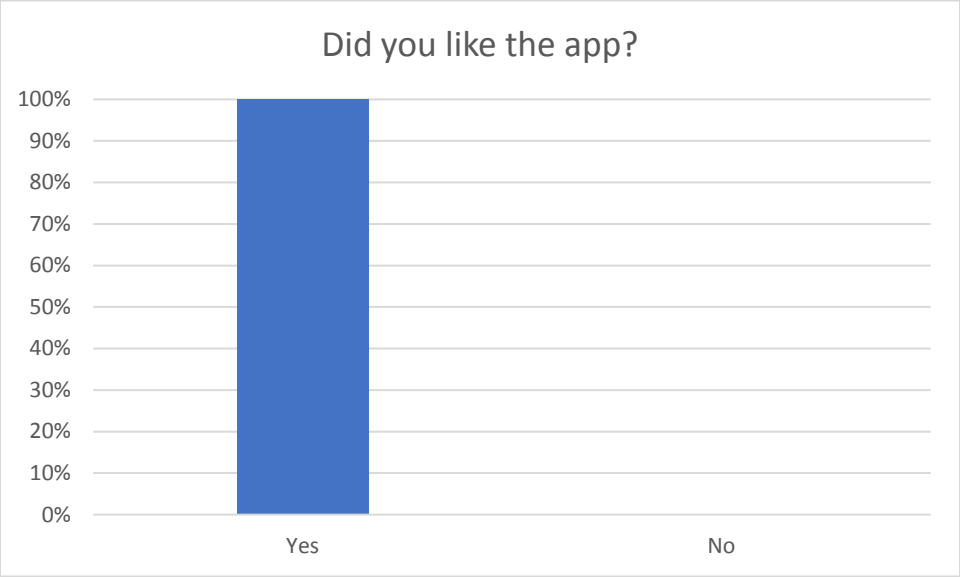
Post Test Questionnaire

Q. I thought I clearly understood the objective of the app



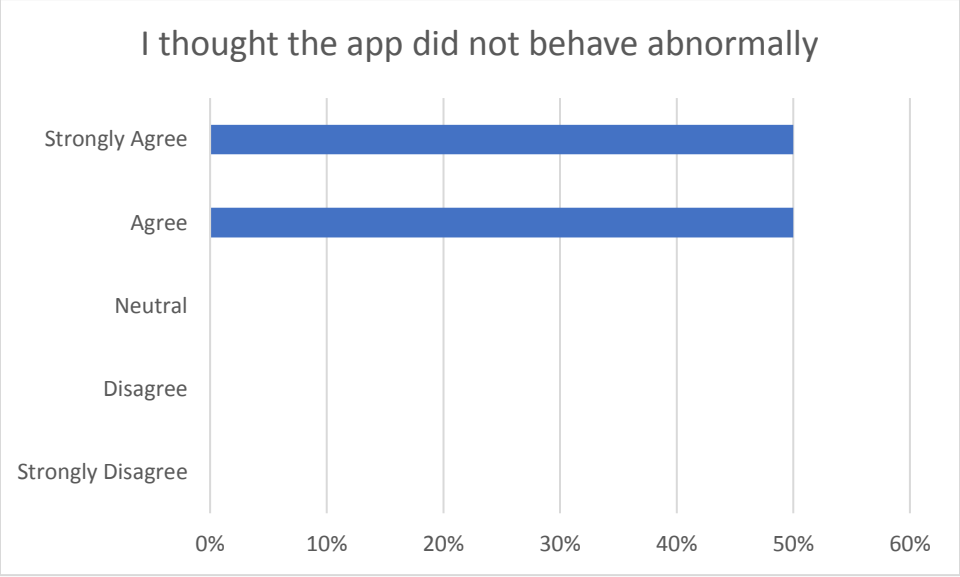
Most of the participants agreed to have understood the objectives of the app before performing the testing.

Q. Did you like the app?



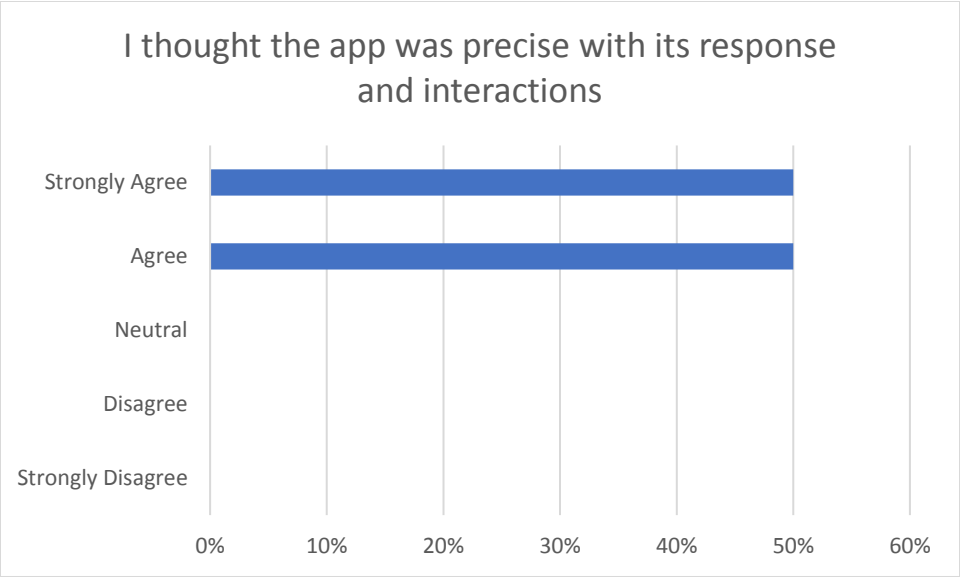
All the participants liked working and interacting with the app

Q. I thought the app did not behave abnormally



All the participants agreed that the app did not act abnormally and was consistent with its normal behavior

Q. I thought the app was precise with its response and interactions



All the participants agreed that the app was precise with its response and interactions

Conclusions

Overall the Eelgrass monitoring app was found to be very usable from the usability test sessions. After using the Eelgrass Monitoring app, all participants stated they felt confident in their ability to perform the required tasks of both the user and admin roles. They also mentioned that the font and color scheme used was clear and readable. Moreover, The UI was also reported to be clean and responsive. Although all six participants were able to successfully complete all three scenarios, the usability testing highlighted some key usability concerns within the Eelgrass Monitoring app.

- All the participants felt that the textboxes should be enlarged and spaced apart for easy selection on a moving boat
- All the participants reported that the login button was too small and difficult to locate within the login page.
- Some participants recommended for the wording of labels to be improved (P1, P2, P5)
- All the participants reported a lack of validation. They were able to enter erroneous data in multiple text fields.
- The app had compatibility issues with IOS. It was unable to store the entered trip data when using an iPhone (Tested by UX consultants and developers)

- Multiple users were unable to enter the trip data simultaneously using the app. Currently, the app supports only a single user to enter the data at any given time. (Tested by UX consultants and developers)

Recommendations

- Ensure the app is cross-browser and device compatible since the app will be used by a large base of volunteers and they can own smartphones with varied operating systems.
    - Emulators can be used to test the functionality
- Allow multiple users to record data as it might require multiple volunteers to work simultaneously at any given time
    - This can be accomplished by storing data in sessions, tables or temporary files
- Increase the size of the login button in Spring Security
    - Custom views can be used to accomplish this
- Size of checkboxes can be increased
- The Summary page could be made more readable
    - By dividing it into relevant sections or adding headers
    - By improving the wording of labels
- Validation should be addressed and the user should be notified of any missing fields

Appendix A: Undergraduate group member attendance at testing

Date	Time	Location	Team Member Assisting	Team Member Assisting	Attended?
Sunday, April 14	4:00 PM to 5:00 PM	Library 239	Brady Bilderback	Jace Lutey	Yes
Sunday, April 14	5:00 PM to 6:00 PM	Library 239	Jace Lutey	Brady Bilderback	Yes
Tuesday, April 16	12:00 PM to 1:00 PM	Library 233	Jace Lutey	Collin Walker	Yes
Tuesday, April 16	1:00 PM to 2:00 PM	Library 233	Lucas Catron	Collin Walker	Yes
Thursday, April 18	12:00 PM to 1:00 PM	Library 239	Collin Walker	Dylan Gaines	Yes
Thursday, April 18	1:00 PM to 2:00 PM	Library 239	Lucas Catron	Collin Walker	Yes

Appendix B: Bug Report Form

Bug #	Bug Name	Bug Uniqueness	Bug Location	Bug Description
1	Missing Validation	5	Text fields	The app does not have validation for multiple fields and does not store the trip data if any field is empty
2	Compatibility with IOS	5	App running on IOS	Data is not stored when entered on an IPhone
3	Multiple Users	3	App running on any device	The app cannot create records if multiple users are simultaneously entering trip details
4	Summary section (Units and Readability)	4	Summary section	The Summary section had multiple fields with no units and the nomenclature of labels was difficult to understand
5	Download Data Login Button	5	Login Screen (Admin)	The participant was not able to locate login button reported it to be small
6	Secchi Notes	2	Downloaded Secchi Information File	Downloading the excel sheet with data shows an empty secchi notes column. The form does not ask the user for this data.